



Title of Investigation:

College Freshmen Intern Program (CFIP)

Principal Investigators:

Nathan James and Carolyn Ng (Code 690.1)

Other In-house Members of Team:

Marcellus Proctor (Code 562), Adrienne Byrd (Code 603.1), Dick Fahey (Code 663),
Lubna Rana (Code 603.1), and Dave Rosage (Code 602)

Other External Collaborators:

Maryland Space Grant Consortium, Minority University Space Interdisciplinary Network
(MU-SPIN)

Initiation Year:

FY 2004

Aggregate Amount of Funding Authorized in FY 2004 and Earlier Years:

\$25,000

Funding Authorized for FY 2005:

\$2,000

Actual or Expected Expenditure of FY 2005 Funding:

Contracts: \$2,000/EduTech and QSS

Status of Investigation at End of FY 2005:

To transition to component of SIP program

Expected Completion Date:

September 2005

DDF annual report

Purpose of Investigation:

A priority of the NASA Office of Higher Education is building a better pipeline between students in school and the NASA workforce. Currently, NASA-Goddard does not offer programs for college freshmen and sophomores. The purpose of this investigation was to fill that gap by developing a pilot summer-intern program that would assist Goddard in identifying a diverse group of candidates for programs farther along in the pipeline. The first phase of the investigation (CFIP 2004) involved rising college freshmen. This year, the pilot program focused on rising college sophomores.

Accomplishments to Date:

On June 6, 2005 a diverse group of 12 college freshmen—six males and six females—from local universities came to Goddard to participate in a 2-week pilot program. The students were given \$10 per day in “NASA Bucks” for food and a \$60 stipend to cover daily transportation costs.

Prior to their arrival, organizers of the College Freshmen Intern Program (CFIP) met with managers of the Integrated Mission Design Center (IMDC) to finalize the details of how the Center would support the program. We reserved one day of IMDC lab time during which the design center’s highly trained team of engineers would assist CFIP interns in the preliminary design of a lunar-orbit mission using an actual mission study as a guide. This proved to be a winning partnership that was both educationally helpful and fun!

During the first week of the program, the students heard from 21 enthusiastic scientists and engineers who conveyed their passion for space science and technology. The interns also were introduced to their mission design project and divided into two teams of six to learn firsthand the value of teamwork in mission planning. Though initially overwhelmed by the apparent complexity of the task, the students grew increasingly comfortable with the challenge through engaging project-related talks presented by IMDC’s mission-design specialists.

Each morning Goddard’s best and brightest engineers introduced a new role or component of spacecraft-mission design for open discussion. In the afternoons, the students would enjoy behind-the-scenes tours and work on challenging exercises related to the earlier talks of the day. The last day of week one culminated in a visit to the IMDC, where the interns witnessed an actual mission design study in real-time. This experience turned out to be the one of the highlights of the entire internship. At the end of each day, the teams would come together for roundtable discussions where the CFIP coordinators would collect feedback and note the progress of the program.

During the second week, the primary objective was to work hard as a team to complete the project in time for a final presentation on Friday morning. On Wednesday, the two teams combined and compared notes on the progress they were making. Those members with common roles were given time to visit speakers from the previous week and all were encouraged to take the time and to network with others on Center who had expertise in their field of interest. This proved to be very helpful to the interns who needed some expert advice on just how far to go with their preliminary mission design element. The networking opportunity also helped the interns identify potential career mentors who could alert them to future internship opportunities and offer professional career advice.

Week two ended with oral presentations of flip-chart drawings and some overhead displays of their final results. The interns were rated both as a team and individually by a panel of scientists, engineers, and CFIP team members. The students also asked if they could evaluate each other's work and award prizes at the end. The two preliminary design solutions were very different in presentation and approach, but the end results of each were quite impressive to all. The complexity in the calculations and the level of detail in the spacecraft design clearly demonstrated that both teams had spent many additional hours of their own time to complete the task. The level of team commitment to the finished product was commendable.

At the end of the program, each intern was asked to evaluate the internship in the following categories: course influence, career influence, highlights, low points, project suggestions (what to keep/improve), daily agenda, advisors, speakers, and how to make the program more attractive. The complete results (18 pages) were captured electronically, reviewed for future planning, and is available in Excel format upon request. To summarize the responses:

- The students really enjoyed working in teams (a first for many).
- The projects were challenging, but for this group with an even distribution of science and engineering majors, the focus was too heavily oriented toward engineering.
- The tours and IMDC visits were the highlight.
- The expert talks were informative and personable (but really difficult when they're back-to-back).
- The mentors and advisors were very patient and eager to help.
- The students recommended more hands-on sessions and shadowing.
- They also recommended that the program be expanded to 10 weeks, with more housing options and larger stipends.

From the post-evaluation meeting, the CFIP core team identified at least three highly rated candidates for future Goddard internships.

Publications and Conference Presentations:

Visit the College Freshmen Intern Program Web site at <http://space.gsfc.nasa.gov/cfip> for detailed program results.

Planned Future Work:

There are two possible approaches to incorporate CFIP into Goddard's educational programs:

- 1) Expand other Goddard internship programs to include freshmen and sophomores and promote CFIP as the front-end introductory program for these new internships. Already-existing programs could share the funding.
- 2) Expand Goddard's Student Intern Program (SIP) to include freshmen and sophomores and work with these interns using the CFIP model preparing them as candidates for the upper-level programs. The new program would run 8 weeks—a 2-week CFIP-like orientation and a 6-week SIP-like internship with a mentor. However, a new funding structure would need to be

developed if this were a non-residential program. We would recruit rising sophomores only due to the marked difference in maturity level as noted in comparing CFIP 2004 and CFIP 2005. We would solicit mentors who work well with young people. We would use the lessons learned from the pilots in recruiting, designing selection criteria, and implementing the program. We also would continue to target universities and institutions that would help us identify and reach previously untapped underrepresented groups to enhance the diversity of our interns and our workforce.

Key Points Summary:

Project's innovative features: Currently, there are no programs for undergraduate freshmen and sophomores at Goddard. We developed a program that would both expose targeted students to Goddard and allow us to survey these students for likely candidates for other Goddard programs

Potential payoff to Goddard/NASA: The payoff is the expansion of a diverse pool of potential employee candidates, with backgrounds in science, math, engineering, and technology. These recruits would help to replenish and rejuvenate NASA/GSFC's aging workforce.

The criteria for success: Success will be the enrollment of students from this program in additional NASA pipeline activities and/or an increase in diversity of the people in those programs.

Technical risk factors: Currently, there is no funding mechanism to support a nonresidential introductory internship as proposed. To implement this immediately, we would have to modify currently established Goddard programs to include freshmen and sophomores.